October 15, 2015, marks the 8th annual Global Handwashing Day. Handwashing with soap has an important role in child survival and health. About 1.8 million children aged <5 years die each year from diarrheal diseases and pneumonia, the top two causes of death among young children globally.

1. What does WHO stand for?  
   *World Health Organization*

2. According to Table 2 above, which WHO region has the highest proportional mortality rate for diarrhea deaths in the world?  
   *South-East Asia*

3. What was the estimated total diarrhea deaths worldwide in 2004?  
   *1,870,000*

4. Which subregion has the lowest probability of dying from diarrhea as a small child: A, B, C, D, or E?
The effect of handwashing with water or soap on bacterial contamination of hands.

Burton M, Cobb E, Donachie P, Judah G, Curtis V, Schmidt WP.

**Abstract**

Handwashing is thought to be effective for the prevention of transmission of diarrhoea pathogens. However it is not conclusive that handwashing with soap is more effective at reducing contamination with bacteria associated with diarrhoea than using water only. In this study 20 volunteers contaminated their hands deliberately by touching door handles and railings in public spaces. They were then allocated at random to (1) handwashing with water, (2) handwashing with non-antibacterial soap and (3) no handwashing. Each volunteer underwent this procedure 24 times.

**Figure 1**

![Graph showing bacterial contamination](image)

5. What is the control group in this study? **People who did not wash their hands**

6. What was the total sample size for this study? **480 (20 x 24)**

7. According to this study, after touching public spaces, how often will you have bacteria of potential faecal origin on your hands? **44%**

8. According to this study, is hand washing with soap and water more effective at removing bacteria than by washing with water alone? **YES**
Effects of Hand Hygiene Campaigns on Incidence of Laboratory-confirmed Influenza and Absenteeism in Schoolchildren, Cairo, Egypt

Maha Talaat, Salma Afifi, Erica Dueger, Nagwa El-Ashry, Anthony Marfin, Amr Kandeel, Emad Mohareb, and Nasr El-Sayed


Table 2
Incidence of absences caused by illness and reasons for absence in control and intervention schools, Cairo, Egypt, February 16–May 12, 2008*

<table>
<thead>
<tr>
<th>Absence caused by illness</th>
<th>Control, n = 282,832 student-weeks</th>
<th>Intervention, n = 250,584 student-weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. episodes Median (IQR)</td>
<td>No. episodes Median (IQR) Reduction, %</td>
</tr>
<tr>
<td>Overall illness</td>
<td>19,094 7.2 (3.3–9.5)</td>
<td>13,247 5.7 (3.4–7.6) A</td>
</tr>
<tr>
<td>ILI</td>
<td>1,671 0.5 (0.3–1.1)</td>
<td>917 0.3 (0.1–0.7) B</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>1,316 0.3 (0.1–0.6)</td>
<td>639 0.2 (0.0–0.5) C</td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>1,214 0.3 (0.1–0.6)</td>
<td>530 0.1 (0.0–0.4) D</td>
</tr>
</tbody>
</table>

* IQR, interquartile range; ILI, influenza-like illness.

9. According to this study, determine the median % reduction in episodes of missed school for each group above.

   A. 21 (1- (5.7/7.2))
   B. 40
   C. 33
   D. 67

10. What disease were scientists tracking in this study? Influenza

11. Describe three modes of transmission for this disease.

   A. Airborne  B. Contact  C. Droplet (any order)

12. As the population in an area increases, explain why this disease is more likely to spread. Infected people are more likely to be located near other people

13. With this information about a simple way to decrease disease and death, explain 2 reasons why people in developing countries do not routinely wash their hands with soap.

Although persons around the world clean their hands with water, very few use soap to wash their hands because soap and water for hand washing might be less accessible in developing countries. Even when soap is available, it might be reserved primarily for laundry and bathing. Lack of knowledge about bacteria and disease transmission may also keep people from placing importance on washing.
For each of the variables for your patient listed below, identify what type of variable it is.

A. Nominal
B. Ordinal
C. Interval
D. Ratio

14. C__ DOB: November 12, 1948
15. A__ Raleigh, NC
16. D__ 67 years old
17. A__ Male
18. D__ 6cm tumor
19. B__ Stage 3 Liver Cancer

A nominal-scale variable is one whose values are categories without any numerical ranking, such as county of residence. In epidemiology, nominal variables with only two categories are very common: alive or dead, ill or well, vaccinated or unvaccinated, or did or did not eat the potato salad. A nominal variable with two mutually exclusive categories is sometimes called a dichotomous variable.

An ordinal-scale variable has values that can be ranked but are not necessarily evenly spaced, such as stage of cancer (see Table 2.3).

An interval-scale variable is measured on a scale of equally spaced units, but without a true zero point, such as date of birth.

A ratio-scale variable is an interval variable with a true zero point, such as height in centimeters or duration of illness.
20. A number of passengers on a cruise ship from Puerto Rico to the Panama Canal have recently developed a gastrointestinal illness compatible with norovirus (formerly called Norwalk-like virus). Testing for norovirus is not readily available in any nearby island, and the test takes several days even where available. Assuming you are the epidemiologist called on to board the ship and investigate this possible outbreak, your case definition should include, at a minimum: (Choose one best answer)
   A. Clinical criteria, plus specification of time, place, and person
   B. Clinical features, plus the exposure(s) you most suspect
   C. Suspect cases
   D. The nationally agreed standard case definition for disease reporting

21. For the cruise ship scenario described above, how would you display the time course of the outbreak? (Choose one best answer)
   A. Endemic curve
   B. Epidemic curve
   C. Seasonal trend
   D. Secular trend

22. For the cruise ship scenario, if you suspected that the norovirus may have been transmitted by ice made or served aboard ship, how might you display "place"?
   A. Spot map by assigned dinner seating location
   B. Spot map by cabin
   C. Shaded map of United States by state of residence
   D. Shaded map by whether passenger consumed ship’s ice or not

23. Which variables might you include in characterizing the outbreak described in Question 20 by person?
   A. Age of passenger
   B. Detailed food history (what person ate) while aboard ship
   C. Status as passenger or crew
   D. Symptoms

24. Comparing numbers and rates of illness in a community, rates are preferred for: (Choose one best answer)
   A. Conducting surveillance for communicable diseases
   B. Deciding how many doses of immune globulin are needed
   C. Estimating subgroups at highest risk
   D. Telling physicians which strain of influenza is most prevalent
25. Using the data above, what is N equal to?

\[ N = 53 \]

26. Is this graph positively or negatively skewed? **POSITIVELY**
27. Should this incident be considered:
   A. An epidemic
   B. A pandemic
   C. An outbreak
   D. A coincidence

Information about E. coli is provided on the following page. After studying this information, outline the chain of infection by identifying the following:

28. Reservoirs: intestines of humans & animals

29. Portals of exit: fecal matter

30. Modes of transmission: contaminated food or water

31. Portals of entry: digestive & urinary tracts

32. Factors in host susceptibility: age – the very old and very young are most susceptible

33. Incubation period: 3-4 days

34. Agent: bacteria
*Escherichia coli* (*E. coli*) bacteria normally live in the intestines of people and animals. Most *E. coli* are harmless and actually are an important part of a healthy human intestinal tract. However, some *E. coli* are pathogenic, meaning they can cause illness, either diarrhea or illness outside of the intestinal tract. The types of *E. coli* that can cause diarrhea can be transmitted through contaminated water or food, or through contact with animals or persons.

*E. coli* consists of a diverse group of bacteria. Pathogenic *E. coli* strains are categorized into pathotypes. Six pathotypes are associated with diarrhea and collectively are referred to as diarrheagenic *E. coli*.

Compared with STEC O157 infections, identification of non-O157 STEC infections is more complex. First, clinical laboratories must test stool samples for the presence of Shiga toxins. Then, the positive samples must be sent to public health laboratories to look for non-O157 STEC. Clinical laboratories typically cannot identify non-O157 STEC. Other non-O157 STEC serogroups that often cause illness in people in the United States include O26, O111, and O103. Some types of STEC frequently cause severe disease, including bloody diarrhea and hemolytic uremic syndrome (HUS), which is a type of kidney failure. People of any age can become infected. Very young children and the elderly are more likely to develop severe illness and hemolytic uremic syndrome (HUS) than others, but even healthy older children and young adults can become seriously ill.

The symptoms of STEC infections vary for each person but often include severe stomach cramps, diarrhea (often bloody), and vomiting. If there is fever, it usually is not very high (less than 101°F/less than 38.5°C). Most people get better within 5–7 days. Some infections are very mild, but others are severe or even life-threatening.

Around 5–10% of those who are diagnosed with STEC infection develop a potentially life-threatening complication known as hemolytic uremic syndrome (HUS). Clues that a person is developing HUS include decreased frequency of urination, feeling very tired, and losing pink color in cheeks and inside the lower eyelids. Persons with HUS should be hospitalized because their kidneys may stop working and they may develop other serious problems. Most persons with HUS recover within a few weeks, but some suffer permanent damage or die.

The time between ingesting the STEC bacteria and feeling sick is usually 3–4 days after the exposure. The symptoms often begin slowly with mild belly pain or non-bloody diarrhea that worsens over several days. HUS, if it occurs, develops an average 7 days after the first symptoms, when the diarrhea is improving.